

Rapid Assessment Reference Condition Model

The Rapid Assessment is a component of the LANDFIRE project. Reference condition models for the Rapid Assessment were created through a series of expert workshops and a peer-review process in 2004-2005. For more information, please visit www.landfire.gov. Please direct questions to helpdesk@landfire.gov.

Potential Natural Vegetation Group (PNVG):

R2SBBB

Basin Big Sagebrush

General Information

Contributors (additional contributors may be listed under "Model Evolution and Comments")

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Vegetation Type

Shrubland

Dominant Species*

ARTRT

ERTE18

LECI4

General Model Sources

- Literature
 Local Data
 Expert Estimate

LANDFIRE Mapping Zones

12 17
13 18
16

Rapid Assessment Model Zones

- California Pacific Northwest
 Great Basin South Central
 Great Lakes Southeast
 Northeast S. Appalachians
 Northern Plains Southwest
 N-Cent.Rockies

Geographic Range

This PNVG occurs throughout the Great Basin, northward onto the Columbia-Snake River Plateau and south into portions of Mojave Desert (Schultz 1986, West 1983a,b).

Biophysical Site Description

This Group ranges in elevation from about 1000 to 2000 m (3000 to 6000 ft) with extensions to as high as 2500 m (7500 ft) on coarse soil fans (NRCS 2003). Typically soils are deep to very deep with loamy to coarse loamy textures. Soils are well drained with water tables below the rooting zone of the dominant shrubs. Salts, if present, can increase with depth. Soils formed through alluvial processes and typically form fans or valley bottoms with slopes generally less than 8% and typically between 0 and 4% (NRCS 2003).

Annual precipitation ranges from 200 to 350 mm (8 to 14 in). Many locations will occur along valley bottoms outside of the wet meadow areas, but within zones where water tables may attain heights of 150 to 75 cm (60 to 30 in). On lower precipitation sites (200 to 250 mm or 8 to 10 in) these locations may be positioned at the base of slopes such that water may run onto these sites.

Growing degree days range from 90 to 120 days.

Vegetation Description

Not much is written specifically about the dynamics of this vegetation community. What is known is drawn from general descriptions of the differences among the big sagebrush subspecies. West (1983a,b) lists the communities of this subspecies in both the Great Basin sagebrush semi-desert and in the Sagebrush Steppe. The major differences among these subspecies are that sagebrush steppe sites tend to be more productive, but the dynamics should be roughly the same. West (1983a,b) diagrams the relationships among the subspecies and places basin big sagebrush and Wyoming big sagebrush in roughly the same climatic zones

*Dominant and Indicator Species are from the NRCS PLANTS database. To check a species code, please visit <http://plants.usda.gov>.

with the major difference being that soils development would indicate that basin big sagebrush occurs on colder and moister soils than Wyoming big sagebrush. However, soil moisture will overlap as elevation increases.

This is a shrub grassland mixture dominated by basin big sagebrush in the shrub layer and basin wildrye, a deep-rooted cool-season bunchgrass, as codominants (NRCS 2003). In shrub steppe locations, basin wildrye may be replaced by Idaho fescue and bluebunch wheatgrass in moister sites.

Good data regarding plant cover of these sites are difficult to find. NRCS is now providing estimates of canopy cover in their newer ecological site descriptions (NRCS 2003). Based on those estimates, total vascular plant cover will range between 30 to 70 % with the higher amounts occurring on the dry meadows with deep soils on valley bottom locations with higher precipitation and lower cover on deep coarse textured soils with lower precipitation. In locations where Idaho fescue replaces basin wildrye, the cover will likely approach 80 to 90% cover, but data to support this could not be found.

Other shrubs will generally represent less than 10 % of the overall cover and will include various species and subspecies of rabbitbrush. Other grasses will generally be cool season bunchgrasses, with the exception of some rhizomatous grasses on the dry meadows with deep soils and high precipitation. Forbs will represent less than 10 % of the herbaceous cover.

Disturbance Description

Fire -- Plant community composition will change dramatically in the shrub composition immediately after fires. Basin big sagebrush is intolerant to fire (Tirmenstein 1999), thus the community will become a grassland immediately after a fire. Recovery of sagebrush is most often been studied with Wyoming and mountain big sagebrush, but little is known specifically for basin big sagebrush. Wyoming big sagebrush can recover to prefire conditions in Montana within 40 years (Wambolt et al. 2001). Mountain big sagebrush communities are known to have 12 to 25 year fire return intervals (Miller & Tausch 2001).

Insects - Aroga moth -- Population explosions of the webworm larvae of this moth can kill patches of sagebrush in areas (West 1983a). When these explosions occur, sagebrush is eliminated or reduced severely in density.

Adjacency or Identification Concerns

Wyoming big sagebrush sites may occur in similar precipitation zones, especially the 200 to 250 mm (8 to 10 in), but will generally be on shallower soils (less than 75 cm or 30 in).

Mountain big sagebrush may occur in similar precipitation zones, especially the 250 to 350 mm (10 to 14 in), but will generally be on higher elevation locations that may have a shorter growing season. However, both basin and mountain big sagebrush will hybridize in zones where they co-occur.

Salt desert shrub and greasewood communities will likely occur on sites with higher calcium or salts in the soils and can be found in playas of basins in the Great Basin.

Dry meadow communities will occupy similar locations as the productive basin big sagebrush communities along valley bottoms, but dry meadows naturally occupy these areas because water tables will likely be shallower and potentially closer to streams and riparian communities.

This PNVG may be similar to the PNVG R0SBBB for the Northern and Central Rockies model zone, but has some differences due to geographic variability.

Scale Description

Sources of Scale Data Literature Local Data Expert Estimate

The scales used for these descriptions were based on the ecological site descriptions. This follows the mapping scale of the order 3 soils classifications provided by the NRCS. Large areas of granitic alluvium can support extensive basin big sagebrush sites.

Issues/Problems

The extant portion of this community is often limited to small areas. It once dominated many of the deeper, fertile soils in the region, but these areas are currently plowed and used as farmlands.

Fires are often currently fueled by cheatgrass, thus, fire intervals and community responses differ than what would have been seen with the native plant community.

Good information on the fire return information, recovery and the plant coverages in an undisturbed environment are difficult. These communities were historically grazed heavily by livestock. Basin wildrye is intolerant of inappropriate grazing, thus the current coverage of this species is often much lower than what it once was within these communities.

Model Evolution and Comments

Succession Classes

Succession classes are the equivalent of "Vegetation Fuel Classes" as defined in the Interagency FRCC Guidebook (www.frcc.gov).

Class A 15%

Early1 Open

Description

Time Interval in this class is 0 to 10 years. Fires, if they occur are replacement fires that reset to time 0 within this class. The probability of a replacement fire is 2% (1 in 50 years).

Vegetation is dominated by tall perennial cool-season bunchgrasses with a mixture of perennial forbs. The perennial forbs generally will be more prominent immediately after fires, but will decrease in cover within 5 years after disturbance often representing less than 5 % canopy coverage. Shrubs will slowly increase as seedlings establish, grow and begin to expand their cover.

Indicator Species* and Canopy Position

ARTRT
ERTE18
LECI4
ACHY

Upper Layer Lifeform

- Herbaceous
 Shrub
 Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

| | Min | Max |
|-----------------|---------|---------|
| Cover | 0 % | 15 % |
| Height | no data | no data |
| Tree Size Class | no data | |

- Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

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Class B 70%

Midl Open

Description

Time interval in this class is 11- 75 years. Fires are generally replacement fires at 2% probability (1 in 50 years) and drive the class back to A. Mixed fires can occur, but are infrequent at a probability of 0.5% (1 in 200 years). Insects and drought are the two other disturbances that can impact the community and occur about 1% of the time (1 in 100 years), but they will keep the community in class B.

Tall perennial cool-season bunchgrasses (mostly basin wildrye) dominate with basin big sagebrush recovering or codominant. Grasses and forbs will tend to reduce there coverage as shrubs increase their coverage.

Indicator Species* and Canopy Position

ARTRT
ERTE18
ACHY
LECI4

Upper Layer Lifeform

- Herbaceous
- Shrub
- Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

| | Min | Max |
|-----------------|---------|---------|
| Cover | 15 % | 75 % |
| Height | no data | no data |
| Tree Size Class | no data | |

Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Class C 15%

Late1 Open

Description

Time interval of this stage is in excess of 75 years. The probability of replacement fires are slightly reduced with a probability of 1.5 % (1 in 67 years). Replacement fires drive the community to class A. All other disturbance probabilities remain the same, but they drive the class to B.

At class C, shrub coverage may reduce the coverage of the herbaceous component, however, the total coverage should remain about the same.

Indicator Species* and Canopy Position

ARTRT
ERTE18
LECI4
ACHY

Upper Layer Lifeform

- Herbaceous
- Shrub
- Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

| | Min | Max |
|-----------------|---------|---------|
| Cover | 15 % | 50 % |
| Height | no data | no data |
| Tree Size Class | no data | |

Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

*Dominant and Indicator Species are from the NRCS PLANTS database. To check a species code, please visit <http://plants.usda.gov>.

Class D 0%

Late1 Open
Description

Indicator Species* and Canopy Position

Structure Data (for upper layer lifeform)

| | Min | Max |
|-----------------|---------|---------|
| Cover | 0 % | % |
| Height | no data | no data |
| Tree Size Class | no data | |

Upper Layer Lifeform

- Herbaceous
- Shrub
- Tree

Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Fuel Model no data

Class E 0%

Late1 Closed
Description

Indicator Species* and Canopy Position

Structure Data (for upper layer lifeform)

| | Min | Max |
|-----------------|---------|---------|
| Cover | 0 % | % |
| Height | no data | no data |
| Tree Size Class | no data | |

Upper Layer Lifeform

- Herbaceous
- Shrub
- Tree

Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Fuel Model no data

Disturbances

Non-Fire Disturbances Modeled

- Insects/Disease
- Wind/Weather/Stress
- Native Grazing
- Competition
- Other:
- Other:

Fire Regime Group: 4

- I: 0-35 year frequency, low and mixed severity
- II: 0-35 year frequency, replacement severity
- III: 35-200 year frequency, low and mixed severity
- IV: 35-200 year frequency, replacement severity
- V: 200+ year frequency, replacement severity

Fire Intervals (FI):

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is the central tendency modeled. Minimum and maximum show the relative range of fire intervals, if known. Probability is the inverse of fire interval in years and is used in reference condition modeling. Percent of all fires is the percent of all fires in that severity class. All values are estimates and not precise.

Historical Fire Size (acres)

Avg:
Min:
Max:

Sources of Fire Regime Data

- Literature
- Local Data
- Expert Estimate

| | Avg FI | Min FI | Max FI | Probability | Percent of All Fires |
|-------------|--------|--------|--------|-------------|----------------------|
| Replacement | 50 | 10 | 100 | 0.02 | 80 |
| Mixed | 200 | 50 | 300 | 0.005 | 20 |
| Surface | | | | | |
| All Fires | 40 | | | 0.02501 | |

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References

- Brown, J. K. and J. K. Smith, eds. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 257 p.
- Miller, R.F. and R.J. Tausch. 2001. The role of fire in juniper and pinyon woodlands: a descriptive analysis, p. 15-30. In: K.E.M. Galley and T.P. Wilson (eds.), Proceedings of the Invasive Species Workshop: the Role of Fire in the Control and Spread of Invasive Species. Misc. Pub. No. 11, Tall Timbers Res. Sta. Tallahassee, FL.
- NRCS (Natural Resources Conservation Service). 2003. Nevada ecological site descriptions: central Nevada Basin and Range. USDA NRCS, Reno NV.
- Shultz, L.M. 1986. Taxonomic and geographic limits of *Artemisia* subgenus *Tridentatae* (Beetle) McArthur (Asteraceae: Anthemideae). In: McArthur, E.D., Welch, B.L. (comps) Proceedings -- symposium on the biology of *Artemisia* and *Chrysothamnus*; 1984 July 9-13. USDA Forest Service, Intermountain Research Station, Gen Tech Rep INT-200, Ogden UT
- Tirmenstein, D. 1999. *Artemisia tridentata* spp. *Tridentata*. IN: Fire effects Information System [Online]. USDA Forest Service, Rocky Mtn. Res Stn, Fire Sciences Laboratory (Producer). [Http://www.fs.fed.us/database/feis/](http://www.fs.fed.us/database/feis/) 18 Nov 2004
- Wambolt, C.L., K.S. Walhof, and M.R. Frisina. 2001. Recovery of big sagebrush communities after burning in south-western Montana. *J. Environmental Manage.* 61:243-252.
- West, N.E. 1983a. Great Basin-Colorado Plateau sagebrush semi-desert. Pages 331-349 IN: West, NE (ed) Temperate deserts and semi-deserts. Elsevier Scientific Publishing, Amsterdam, Netherlands.
- West, N.E. 1983b. Western intermountain sagebrush steppe. Pages 351-374 IN: West, NE (ed) Temperate deserts and semi-deserts. Elsevier Scientific Publishing, Amsterdam, Netherlands.